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Much material has been written, printed, and published on trends in schoolhouse construction but many of the experts have not bothered to concern themselves in carefully analyzing and understanding the program which is to be housed or the specific needs of the children in the community. In discussing this subject, two distinct realities must be recognized and accepted at the outset. First, some changes have occurred in educational methods and techniques. Second, tremendous strides have been made in construction techniques and building materials. As new trends in school building planning are described, the educational function of the building still demands prime consideration. The design or style of architecture of a building will not in and of itself assure the best educational program. The significant trends elaborated on include--(1) flexibility, (2) team teaching, (3) shape of modern school buildings, (4) windowless classrooms, (5) carpeting, (6) temperature controlled school buildings, (7) ungraded primary schools, (8) electric heat, (9) library as functional learning center, and (10) educational specifications. (RK)

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TRENDS IN SCHOOLHOUSE CONSTRUCTION

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An abundance of material has been written, printed, and published on trends in schoolhouse construction and yet, by and large, many of the experts have not bothered to concern themselves in carefully analyzing and understanding the program which is to be housed or the specific needs of the children residing in the community. This is indeed curious. After all, buildings are designed for people and an understanding of the purpose for designing should be the first order of business. Probably the people in the building research field traditionally and properly deal with buildings and their components. People working in the understanding of human beings and their welfare have not concerned themselves to any great extent with buildings. The two must get together and design buildings, applying information available in both fields.

It appears that two distinct realities must be recognized and accepted at the outset in discussing this subject. First, some changes have occurred in educational methods and techniques. In most instances, these new innovations have not changed the educational philosophy. Probably the basic goals of education have changed very little in recent years. However, the knowledge and understanding of how to obtain these goals have changed greatly.

Second, it must be recognized that tremendous strides have been made in construction techniques and building materials. Architects and school authorities have taken advantage of these technological advances. The architects and designers have greatly expanded their dreams and developed various shaped buildings. These include everything from the traditional rectangular building to the completely circular building.

Before school officials attack the very complex and challenging task of planning new school facilities, some very definite determinations must be

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made. The educational philosophy and goals of the school and community must be determined. It is not sufficient to talk about this but a careful study should be made and the findings reduced to writing. This philosophy must recognize not only the students' need for the mastery of the useful arts of reading, writing, arithmetic, history, geography and science but also physical health, emotional and social adjustment, self-expression, and the development of special aptitudes.

In planning any kind of a school facility, it is the duty of every school board and administration to find out as accurately as possible the educational and social needs of the students and people residing in the community. These needs should be incorporated into the plan of every school building so the student attending school and the taxpayer can get the greatest return from the initial investment.

It appears that few people have the background, interest or capacity to make a comprehensive search in depth to discover the apparent needs of the school and community. Likewise, many are unable to see the direction in which education is moving in this age of automation, science, chemicals, combustion, computers, and the conquest of space.

Perhaps a word of caution would be appropriate at this point. It appears that many of the so-called new trends in educational methods are simply old ideas in a new cloak and under a different name. Most are devices of teaching and/or administrative organization. All the new trends taken as a whole do not constitute educational continuity but are fragments utilized to enrich an existing educational program. Many are good and should be fully utilized, others bear additional intensive study.

Once the board and administrators grasp the fact that an educational program must be developed and planned before a school building can be properly designed, they often fail to recognize and acknowledge the apparent need for

designing the facility in such a manner that it can be readily adapted to changes in the educational programs. New ideas for teaching and learning are constantly being initiated and at the same time many good old ideas are being resurrected. Authorities are generally agreed that really nothing in education is static. Improvements are long overdue and it is most difficult to anticipate the inevitable changes of the future. Thus it becomes essential that a thorough study be made of the school districts present and project needs before developing a new curriculum and designing facilities to house the programs.

In the February 1965 issue of The American School Board Journal, Dr. Harold Silverthorn, Building Consultant for Northshore School District 417, Bothell, Washington says, "It is possible from current literature, studies, and research to detect what appears to be indications of educational trends. Obviously nothing in education is completely black or white, but the direction the trends seem to be moving may be significant and can be stated briefly. (This listing is derived from hundreds of education related publications.)

	Away From	Toward
1.	Memorization of information	Comprehension and understanding
2.	Accumulation of information	Concept establishment and development
3.	Instruction	Learning
4.	Facts and principles	Values
5.	Tests	Application
6.	Lecture	Self-directed study and learning
7.	Conformity	Creativity
8.	Group instruction	More individual instruction
9.	Cookbook directions	Discovery
10.	Lecture	Laboratory
11.	Subject-matter fragmentation	Integration of material
12.	Imposed discipline	Self-discipline
13.	Scope and sequence	Structure of the subject
14.	All instruction grouped for 30	Large group visual instruction
15.	Infallible authority	Varied sources
16.	Problem solution	Problem identification
17.	Indoctrination and training	Learning as a personal matter
18.	Tradition	New explorations
19.	Education as a finished product	Continuing lifetime learning
20.	Textbook outline and content	Selected content
21.	A common curriculum for all children	Special education
22.	Satelite libraries	General library
23.	Emphasis on text and reference books	A broadly conceived library
24.	A completely one-teacher-dominated classroom	Use of machines--microfilm, reader, programer, etc.

"It is the analysis of the above items that points a direction we seem to be moving toward in our educational programs that have implications for school design. The esoteric persons who have the capacity to see these implications and can extrapolate them articulately so the building designer can translate these ideas into flexible architecture make the outstanding contributions to school architecture."

School district reorganization is currently in effect in Kansas as a result of three unification laws. The first, House Bill No. 337, Kansas Session Laws 1963. The other two, House Bill No. 539 and Senate Bill No. 402, were passed by the 1965 Legislature. As a result, school districts have been reduced from a total of 1744 in the year 1964 to 287 unified and 160 non-unified districts as of June 1, 1965. Predictions indicate that upon completion of unification, Kansas will probably have only some 300 plus unified school districts. Undoubtedly the reorganization of school districts in Kansas will necessitate new or additional facilities for many of the new unified school districts. The proper approach for such districts is to have a comprehensive survey to evaluate existing school plant facilities and make recommendations for additions or new facilities as needed. As new facilities are needed and planned, the board and administration should be fully cognizant of recent trends in schoolhouse planning and construction.

As new trends in school building planning are discussed, it must be pointed out that the educational function of the building still demands prime consideration. The design or style of architecture of a building will not in and of itself assure the best educational program.

In approaching this topic, ten significant trends will be discussed, namely: (1) flexibility, (2) team teaching, (3) shape of modern school buildings, (4) windowless classrooms, (5) carpeting, (6) temperature controlled school buildings, (7) ungraded primary school, (8) electric heat, (9) library

as functional learning center, and (10) educational specifications. No attempt was made to arrange these trends in the order of their importance.

1. A term which has probably been overworked is "flexibility." Yet, it is most important to understand the full meaning of the term flexibility, and more important to design flexible facilities. The Guide for Planning School Plants, published by the National Council on Schoolhouse Construction, states: "The term 'flexibility' covers the following meanings: convertibility and adaptability, expansibility and contractability, and suitability for multiple use. These meanings, or values, can be designed into the facilities through the dimensioning and definition of building and space perimeters; through the structural system and kinds of space dividers; and through the location and sizing of service systems."

What brings on this drive for flexibility? Primarily because education is fluid and tends to take the shape of its container. For many years our education was so arranged that the container we built fit the way we wanted to arrange the occupants. Currently education is literally bursting out the walls because the container does not seem to fit in some places.

Flexibility is much more than the fact that two or more classrooms are divisible by a fabric movable wall. For a building to be classified as flexible, literally dozens of items must be coordinated and reduced to a performance standard. The architectural profession has generally accepted William Caudill's analysis of three types of flexibility: (1) <u>immediate</u> (folding partitions); (2) <u>overnight</u> (easily removable partitions); (3) <u>over the summer</u> (space that can be changed at some expense in a few weeks). For a space to be truly flexible, it should be easily adaptable to expansion or divisibility at a cost not to exceed 5 percent of the original cost of the construction. Such a building should have non-load bearing walls, and not be filled with pipe and conduit.

School authorities must keep in mind that flexibility and expandability are not achieved on the drawing boards alone. Such results are accomplished by communication, understanding, exploration, patience, integrity and imagination with and among those individuals responsible for planning the facility.

2. Team teaching, to be very effective, requires considerable flexibility in building spaces. Usually associated with team teaching is a combination of individual, small, and large group instruction. Thus, it follows that a building designed for this technique of teaching should be planned, designed and constructed with flexible teaching areas. It should have spaces for individual study. Spaces for small groups to work on special assignments, with or without a teacher. Spaces for large groups to assemble for lectures and other presentations. Some of the large spaces should seat comfortably about 100 students or more.

A team normally includes three teachers, each doing the job he does best, and non-teaching assistants who handle clerical work and other non-instructional duties. Team members may lecture to large groups, lead small-group discussions, or supervise individual research projects or special instruction.

Because of the present wide acceptance of team teaching, many schools have designed their building specifically for this concept. The wisdom of planning the entire building for a single purpose is questionable since there is little scientific evidence to prove the overall effectiveness of this approach. Although the success of this type of program is not completely dependent upon the building housing it, the potential for a better program is possible with properly planned facilities.

3. The shape of a school building should be determined primarily by its particular function or educational requirement. Obviously, location and cost must be taken into consideration. Most school people are taking a realistic look and attitude toward the current trends. They are asking, "Why build a

circular, oval, pic, octoganal, or practically any other shape school building?" The most frequent answers are: (1) More square footage can be encompassed in a circular building as against any other design with the least amount of perimeter wall. (2) Everything else being equal, the initial cost of the mechanical system and its operation will be less, probably due to the compactness of the building and the utilization of a minimum amount of window space. (3) Many buildings of this type require less corridor space and thus are more economical and more practical. (4) Proponents of these buildings point out that the roof structure can be designed more economically if there is sufficient repetition in the method of forming the roof structure.

Much could be said on this subject but the requirements and needs of a school district, and thus the ultimate shape of the building, should be determined by local school authorities. But not until a comprehensive study has been made indicating specific needs and trends. An evaluation of such a study by the board, adminstration, architect, staff and community should then dictate the shape of the building.

To illustrate the above point -- Riverview Gardens, Missouri has two similar elementary school buildings designed and constructed which might be described generally as a snail-shaped school. The central whorl of the snail houses a resource center (essentially a library), an area for individual or small-group instruction, a theater which will double as an area for large-group instruction, and administrative spaces. Except for the offices and theater, this entire area is really one large open space to be subdivided by furniture.

The outer whorl contains a circle of classrooms; each carpeted for acoustical privacy and all open onto the central whorl. At the spot which is best described as that area where the snail comes out of his shell, is a covered area for physical education. Finally, at the core of the whole school -- the

"heart" of the school in more ways than one -- is a planning and work area from which the staff gets its materials and equipment. An interesting article describing the school has recently been published in the Saturday Evening Post, June 19, 1965 issue.

4. School building design people have made a complete cycle from utilizing as much glass as possible to a complete windowless classroom. Research study in this field is limited and inconclusive. A study of scholastic achievement in three Hobbs, New Mexico junior high schools to date does not produce any firm conclusion. Two of the buildings are traditional and one is windowless. The study appears to suggest that students of equal ability and background will achieve about equally in either type building. Artesia, New Mexico has an underground elementary school. The town has one windowless elementary school built above ground and two elementary schools of traditional design.

In the spring of 1963, the board of education secured Dr. Frank W. Lutz, St. Louis University in Missouri to do research work and study the effect of the educational environment and the educational outcomes in an underground school, a windowless school, and two conventional schools. His findings are:

1. "Our conclusions in the area of schievement, when other factors influencing achievement are held constant either statistically or matched, showed no apparent differences in the children from the four elementary schools in this study.

2. "No significant differences in the four schools were found in any of the pupil behavior indices.

3. "The study indicates that children attending the underground school showed less anxiety than other children.

4. "We conclude that the teachers in the different school environments were not exhibiting any difference in attitude or anxiety at the time of measurement."

Until data is available to indicate that windowless rooms are more effective, it would appear more functional from the standpoint of education to design buildings with at least a limited amount of window space. Some architects are

accomplishing this beautifully by using a single narrow vertical window as against a horizontal vision strip.

5. Wall to wall carpeting, once considered an item of decoration or furnishing for such school spaces as the superintendent's office and board room, is now being requested by school boards and administrators as basic floor-covering material for almost all school areas, including classrooms and in some instances corridors. Carpeting serves as an excellent acoustical and insulative floor covering. This is especially true in facilities developed with greater flexibility and freedom. Good acoustics in an open area are essential, and a carpet is most effective in catching sound where it occurs -- on the floor.

Studies show that economically lower maintenance costs are expected to recover the higher first cost before the carpet needs replacing. Additional savings are likely in heating since carpeting tends to retain heat. Less money is needed for initial construction if planned from the beginning. Carpet installation needs only underflooring of plywood or concrete. Probably the greatest result, not measurable in dollars and cents, is the "dejuvenilized" and relaxed atmosphere. A student at ease in his environment can direct his energies toward learning.

6. Temperature controlled school buildings today cannot be considered a luxury. Virtually all residential homes and commercial buildings have year round temperature control. Most new automobiles, shopping centers, recreational centers, theaters and places of amusement are fully air conditioned. In fact, the child will probably not be familiar with a building that does not have temperature control until he enters school.

The child of school age, with his only partially integrated nervous system, has just so much energy to expend. This energy must go toward his basic survival, protective and growth needs. This leaves only a limited amount of his energy free for learning.

If environmental demands should exceed his free energy, the child's basic biological and growth process will be hampered and his learning impaired.

Temperature is one physical force in the classroom environment that must be controlled for the benefit of the child's health, for optimum development of his learning -- earning skills.

There is a trend toward year-round use of the school buildings which makes air conditioning doubly important. This, plus the fact that one-fourth of the people in the United States spend their working day in schools as pupils or teachers. Perhaps the time element is not important but someone must be interested in the effectiveness of the learning process during this time.

7. A number of school districts across the nation are organizing an "ungraded primary school." Other school men choose to refer to this organization as a "continuous progress program." The apparent basic educational philosophy underlying this concept is a continuous three-year learning program for the child. Virtually each program is different in some respects. However, most districts develop their program around a certain number of levels. Supposedly each child should complete all levels by the end of the third year. Thus if a child does not complete all levels and is not ready for the fourth grade, he would continue for another year at the primary level.

School authorities in some districts are planning and designing new facilities to house this special type of program. Although many of the programs are being conducted successfully in elementary school buildings designed for conventional teaching.

8. There are two major factors behind the rapid increase in the use of electricity in school buildings. The first is that the electric companies are doing a thorough job of informing school men and boards about the advantages of electricity. The second is the declining cost of electricity, especially notable in relation to the rising cost of other fuels. This is particularly

true for larger consumers of electricity who find that the rate drops sharply as their usage increases. The U. S. Department of Commerce statistics show that electric costs have dropped more than 10% in the last 10 years.

Construction costs and initial cost of heating equipment are both lower for an electrically heated school than for a conventional system. Initial construction costs are lower because such expensive items as boiler room, chimney, fuel storage, pipe tunnels, and crawl space can be eliminated. Annual maintenance and repair costs have been found to be somewhat lower.

School authorities contemplating the use of electric heat should make a careful cost analysis study comparing this type of heat with other fuels available in the school district before arriving at a decision.

9. In today's modern school, a functional library becomes a learning center for the instructional program. This center should encompass a broad range of activities and services in addition to housing learning materials and equipment for both pupils and teachers. Books and other printed resources are supplemented by flat pictures, maps, filmstrips, transparencies, slides, disc and tape recordings, programmed materials, models, magazines on microfilm, video tape, and other available materials as desired.

The modern school library is not just a place for organization of all materials. It is a place of utilization, and the students and teachers should have access to portable televisions, filmstrip viewers, listening stations equipped with phonographs and tape recorders, microfilm readers and printer-copiers, overhead and opaque projectors which can be used in the learning center or the classroom.

Facilities for independent study and spaces for the preparation of materials characterize the modern library. The main library to be functional should include at least the following: (1) reading and circulation center; (2) listening and viewing area; (3) large and small conference rooms;

(4) classroom area; (5) book stacks; (6) conference and faculty offices; (7) workrooms for librarians, teachers and students; (8) office for librarians; (9) display and special collection area; (10) ample storage space; (11) perimeter and/or clustered carrels for independent student study, some of which should be especially soundproofed and equipped with typewriters so that students might type their lessons without disturbing others; (12) a teacher preparation center for faculty utilization in preparing teaching materials. This space to include equipment, supplies, professional books and magazines; (13) storage space for A-V materials and equipment as necessary, and (14) other spaces as needed.

Some of the more modern libraries are providing some student storage areas for collected research materials, thus eliminating checking in all materials at the end of the period or day and starting from scratch the next time.

A classroom in the library complex will provide space for library instuction, for book discussion groups, serve as a seminar room for the school, and as an overflow area for the main reading room.

The library, the same as the rest of the school building, should not be designed until the curriculum has been fully developed. It would be well to design the library as flexible as possible to allow for future changes and expansion.

The library should be located centrally, yet in such a manner that it could be kept open at night or on weekends. The library complex should be equipped with restrooms and in general operate independently from the rest of the building. Ample parking space should be provided adjacent to the library.

10. Educational specifications should be a written document prepared by an educational consultant or school district administration and staff. They should clearly and distinctly interpret the school program for the architect so he might develop and design a building to adequately house the proposed program.

According to the Guide for Planning School Plants, published by the National Council on Schoolhouse Construction, an outline of the contents of a set of education specifications should contain the following:

"A. General information
   1. Philosophy and objectives of the school
   2. Community characteristics
   3. Pupils to be housed
   4. Provision for community use
   5. Site and site development
   6. General design of the building
   7. General arrangement of interior spaces
   8. Policy concerning multiple use of space
   9. Funds available
   10. Nature of any likely future expansion

"B. Complete listing of the facilities to be provided

"C. Detailed description of each room and space to be provided
   1. General description of the space
   2. Activities to be carried on in each space
   3. Location and traffic circulation
   4. Furniture and equipment
   5. Storage
   6. Audio-visual requirements
   7. Utility requirements
   8. Other special considerations

"D. Miscellaneous requirements"

Often it follows that there is little relationship between educational specifications and a good functional, attractive school building. Excellent buildings are the result of good preliminary studies in depth of philosophy, research, trends and current best practices in education that may or may not become a part of the educational specifications. Interpretation of the program and educational specifications, unless it develops into specifics, may not produce the type of structure visualized by the planners.

In conclusion, it can be stated unequivocally that there are obviously innumerable new trends in the school building field. These trends will continue if the future is to be judged by the past. There is no easy solution in sight to guide school administrators, school consultants, board members and the communities concerned with the utilization of these trends in the planning

and construction of new school buildings. Choices will need to be made and those concerned with education must study and evaluate each new trend and innovation as it is developed and make decisions accordingly.

New developments can be expected at all levels of education; elementary, secondary, college and university. These changes will not only occur in the school facilities field but in administrative organization, curriculum, instructional competence, and financial support. To place emphasis on any one or a combination of these factors while neglecting others will inevitable result in an inadequate educational program. As a result, the planning of school facilities will be a constant change. Most authorities are positive in the fact that neither a perfect system of instruction or a perfect school building has been designed. Yet, every new program that is carefully planned utilizing all available resources, and a building which is just as carefully planned and designed to house this program, is a step closer to perfection.

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